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# AGRICULTURAL DEVELOPMENT IN THE UNITED STATES, 1900–1910[1]

## SUMMARY

The agricultural area largely occupied by 1900, 2. — Proportion of land under cultivation in 1900 and 1910, 3. — Proportion of improved land, 4. — How agriculture will expand in the twentieth century, 7. — Increase in value of farm property, 11. — Slight increase in *quantity* of farm produce, 12. — Large increase in *value* of crops, 13. — Increase of prices proved, 18. — The years 1899 and 1909 representative, 24. — Agriculture is not keeping pace with population, 25.

One of the most remarkable changes which took place in the United States during the nineteenth century was the extraordinary expansion of agriculture. An entire continent was seized, the former inhabitants were dispossessed, and the land was divided among a new people and brought into general use. It seems impossible that this should have been accomplished in so short a time, and that it was accomplished will be set down as one of the marvels of all time. It is not my purpose, however, to dwell at length upon the extent of the movements of the last century, nor is it my purpose to go into detail with respect to the rapidity with which the changes took place. Inasmuch as the changes of the nineteenth century have already been presented to the public in many forms and are probably better known than those of the twentieth century, I propose to give most attention to the agricultural development of the first decade of the twentieth century.

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[1] All of the statistics quoted have been made public in some form by the Bureau of the Census, either in the form of press notices or bulletins of the agricultural division. They will appear later in the Abstract of the Thirteenth Decennial Census and in the General Reports issued by the Census Bureau.

Suffice it to say in opening that the very rapid movement looking toward the extension or expansion of agriculture into all parts of the country during the last century came almost to a standstill with the close of the century. The area available for agricultural purposes was very largely occupied between 1800 and 1900. It is true that there is still a large amount of land which must be made available, and the agricultural industry will continue to expand. Land now thought unavailable for agriculture will soon be found to be available or will be made so. Water will be drained from the land where there is too much, and carried to the land where there is not enough; stones will be carried away; and stumps will be torn out. Land which is now thought to be too sandy or too gravelly will be brought into use by new scientific methods. Land which is now thought to be worn out will be brought into bearing again. Some land which is now in forests will be used for agricultural purposes. In these and various other ways the agricultural area will expand during the twentieth century. But this expansion, when compared with the movement of the last century, will be of a different kind, and it will be small, indeed will be insignificant. The change in methods of farming, however, may be greater during the present century than during the last.

In proof of the above statement, I wish to submit briefly some of the statistics gathered at the Census of 1910 and compare them with those gathered at the Census of 1900. The increase in acreage of land in farms during the decade amounted to only 4.8 per cent. The increase averaged approximately 4,000,000 acres per year. On the other hand, the increase during the thirty years before 1900 was almost 15,000,000 acres per year. This statement in itself is sufficient evidence of the fact that the high tide was reached before the close of the last century, and that the expansion since 1900 has been and doubtless will continue to be comparatively small.

Before leaving this phase of the subject, attention should be called to the fact that altho the movement doubtless will be slow, there is room for it to continue over a long period of time, depending on the needs of the people, scientific progress, and initiative displayed. Altho the movement during the last century was rapid, only 44.1 per cent of the land area of continental United States was actually included in farms in 1900. In 1910 this had increased to only 46.2 per cent. Thus, between 1900 and 1910, 2.1 per cent of the entire land area of the country was brought into farms. By quoting these figures I do not mean to leave the impression that all of the other 53.8 per cent can ever be brought into farms. This represents the land in mines, the mountain areas, the land occupied by cities, towns, and villages, the railroad rights of way, the public highways, deserts, swamps, and forests. Much of this land, however, can be made available for argiculture and much will be brought into use. During the last century it was possible for the movement to be rapid because special knowledge and advanced scientific principles were unnecessary.

Natural fertility of the soil, plenty of land available, and advantageous climatic conditions made rapid advance possible. The movement of the twentieth century must be very different from that of the nineteenth.

To say that the amount of land in farms increased very slowly during the last ten years, and that the amount of land easily available has been reduced to a very low ebb does not mean that further agricultural development is limited to the bringing of new land into farms. Much of the land which is at the present time included in the farms of the United States has never been improved. The Census reports for 1900 showed that only 49.4 per cent, or slightly less than one-half, of all of the land in farms was improved. In other words, only 21.8 per cent of the total land area of the United States was reported as improved at that time. It would seem strange if only one-fifth of the total land area of the United States could be actually used for agricultural purposes. It may be noted, in passing, that much of the unimproved land is also used for agricultural purposes, inasmuch as it is used more or less for grazing. Yet the total income from the use of this unimproved land is very small. It would seem that the farmers of the United States, inasmuch as they were free to choose the best land available at the time they became farmers and inasmuch as they have now looked over the entire country, would choose land which could be most readily improved, and therefore it is very likely that the lands now in farms in the United States are in the sections most adapted to agriculture. It is, therefore, reasonable to conclude that much of the development of the twentieth century must turn to improving land already in farms but which in 1900 was woodland or other unimproved land. I have already noted that during the first ten years of the new century the increase in acreage of all land in farms was only 4.8 per cent. During this same period, however, the increase in improved land in farms was 15.4 per cent. Assuming that only 15.4 per cent of the land brought into farms during the decade was improved during that time, it is clear that nearly fifty-eight million acres of land which was in farms but unimproved at the beginning of the century was improved between 1900 and 1910. In 1910 the improved land in farms represented 25.1 per cent, or about one-fourth of the total land area of the United States, and represented 54.4 per cent, or slightly more than one-half, of all land in farms. It is reasonable to believe that as we proceed in the new century, much of the woodland and other unimproved land in farms, situated as it is in the most favorable farming regions of the United States, will be improved and developed.

Attention was called above to the fact that in 1900 only 49.4 per cent, or slightly less than one-half, of all land in farms, or only about one-fifth of the land area of the United States, was reported as improved. The Census of 1900 showed that in 1899 only 283,218,280 acres of the improved land were devoted to crops for which it was possible to secure a statement of acreage reports. Thus in 1899 only 68.3 per cent of the improved land in farms was actually used for cropping purposes. In other words, only 33.8 per cent of all land in farms was reported to be in cultivated crops. This was only 14.9 per cent of the total land area of the country. The Census of 1910 presents a corresponding report. In 1909 only 311,293,382 acres of land were reported as actually in crops for which acreage reports were secured. The crops with acreage reports, therefore, occupied only 16.4 per cent of the total land areas; 35.4 per cent of the total land in farms; and 65.1 per cent of the total improved land.

The question necessarily arises as to the use made of improved land not accounted for in 1909 and 1899. These statistics have been criticised, it being contended that much land was reported as improved which should in fact be reported as unimproved. Having been intimately associated from its beginning with the Census of agriculture taken in 1910, but with no desire to defend it if it should not be defended, I wish to call attention to the fact that in 1909 the area reported as improved, but for which no crops were specified, must have existed in the form reported in order to represent current conditions. In the first place, no acreage report was secured for vineyards and orchards. Without attempting to make an absolute estimate of the probable number of acres of improved land devoted to these branches of agriculture, it is easy to show that at least 8,000,000 acres of land, probably 10,000,000 acres, were used for these purposes in 1909. Much more important than the land occupied by fruit and nut trees and vines is the very large improved area in pastures. In the northeastern part of the United States especially, where the farmers have learned to rotate their crops and where the live stock industry is important, improved pasture land is an important feature of the average farm. It is my belief that in a large part of the country the improved land not reported in specified crops is largely used as improved pasture land. In other parts of the country, where rotation and diversified agriculture have not been introduced, it is very common to leave land lying fallow after it has been cropped four or five years in succession. This land is reported as improved altho not actually in use in 1909. In addition to the vineyards and orchards, it is easy to account for about 20,000,000 acres of land in the house yards, barn yards and lanes of the farms of this country. Even this estimate allows only 3 acres for each farm.

One of the movements of the present century must be a more complete utilization of the improved land. Land lying fallow must be brought into constant use; land now reported as improved pasture must be made more productive, and it may even be part of the movement to do away with improved pasture land in due course of time, inasmuch as larger quantities of product could be raised on the same land and fed to the animals in another way; and woodland and other land not improved must be converted into good pasture land.

The expansion in agriculture during the twentieth century will, therefore, be in marked contrast to the expansion during the nineteenth century. During the last century, as noted above, the great movement was to the West, — the ordinary course was to locate a piece of land which required comparatively little labor to bring it into use, claim it, and convert it into a farm. The movement during the twentieth century will be along four distinct lines, each different from the movement of the nineteenth century. Briefly, the first of these will be to make farms out of land not now in farms by draining wet places, irrigating dry places, pulling stumps, moving stones, and the like. The second will be somewhat similar to the first. It will be to improve the woodland and other unimproved land now in farms by the processes noted above. The third will be to put into active and more constant use the land already reported as improved. This means the elimination of summer fallow and better utilization of other land reported as improved but not accounted for in the report of specific crops. The fourth, unlike the third, will be the movement towards more intensive cultivation, better farm methods, and better organization of the farm work.

Now the four movements which I have indicated above as possible and, indeed, as necessary, if the food supply of the United States is to be maintained at its present level during the twentieth century, have already begun. But they are so much slower than the increase of population that agriculture has fallen far behind and is at the present time falling further and further behind. There is no question in my mind that this failure to keep pace with the general industrial movement of the country is one of the most important causes of the high cost of living so much talked about at the present time. Unless some of the movements indicated above progress with much greater rapidity than now, the high cost of living will go even higher.

When the old movement stopped, when the frontier had disappeared, when the people commenced to say to themselves that there was practically no more free land, they turned their attention more and more towards other activities. They turned to manufacturing, to transportation, to the trades, and to the professions. This fact is well known to all who have observed closely and can also be demonstrated statistically. The actual extent of the movement should be briefly set down in order that the entire situation may be made clear. During the first ten years of the present century, the number of farms in the United States increased 10.9 per cent. This was clearly due to the splitting up of many large farms; since, as already noted, the amount of land in farms increased only 4.8 per cent. Further, this increase of 10.9 per cent in the number of farms accounts very largely for the increased acreage of improved land in farms (15.4 per cent) as also the increased acreage of land in crops (9.9 per cent). In contrast to the increase in the number of farms, the increase in the rural population was 11.2 per cent. It would appear that the increase in the population of towns and villages with less than 2,500 inhabitants was not much greater than the increase in the number of farms. In contrast to this comparatively small increase in the number of farms and in the rural population, the increase in the urban population amounted to 34.8 per cent. With these facts before us, it is easy to see that agriculture had reached practically its limit in 1900 so far as following the old method of expansion was concerned, and also that the four movements to which I referred had not gotten well enough started to keep pace with the increase in population which is rapidly concentrating in cities.

During the nineteenth century the farmers produced very much more than the people of the United States could consume, and the surplus was shipped to foreign countries. As agriculture developed less rapidly and as the proportion of the people who lived in cities increased more rapidly, the exportation of the raw materials of agriculture necessarily decreased. We have now reached a stage in the history of this country when farmers in average years do not produce much more of the raw materials used for food, beverage, and clothing than is needed within the country. In poor years the production may not in the future equal the demands of the consumers. In exceptionally good years, it will be possible to export a considerable amount of raw material or reserve it for the bad years to follow. I think it is very doubtful whether the four new movements towards agricultural development which have been indicated above will be more than sufficient to keep pace with the movement of population. If, by inaugurating these four movements, it is impossible to keep pace with the population, it will be necessary in the future to resort to the importation of supplies.

Inasmuch as development during the first decade of the new century was not as rapid in agriculture as in other industries, the farmers have been placed in a more or less advantageous position because of their ability to force up land values and take advantage of the increased pressure. This is true, however, only of those farmers who have become land owners. There are at the present time about 6,362,000 farmers in the United States. Only about 4,000,000 of these own all or a part of their farms, and many of those who own their farms have not paid the entire purchase price. The point that I wish to make is that those who have title to their land, — whether they have the land entirely paid for or not, — are being placed more and more in advantageous positions. Land values during the next half century will change greatly. Tho in many districts doubtless the values are at the present time too high, generally speaking they will advance. The movement will be in two directions. One of these will be a readjustment downward to a reasonable level, and the other will be a readjustment upward to conform to average values in other parts of the country.

I have outlined above briefly the characteristics of the movement during the nineteenth century and the characteristics of the movement which is likely to take place during the first half of the twentieth century, and have quoted some statistics to substantiate the conclusions. In order to show the extent to which this movement actually is taking place, it is worth while to quote more of the results of the Census of 1900 as compared with those of the Census of 1910. In 1900 the average value of all farm property per acre of land in farms was $24.37; in 1910 it was $46.64. This is an increase of 91.4 per cent during the decade, — an increase almost equal to the total increase of all past time. This large increase was due more to change in the value of land than to change in value of buildings, implements and machinery, or live stock. The average value of land per acre (without buildings or equipment), for the United States as a whole, was $15.57 in 1900 as compared with $32.40 in 1910, — an increase of 108.1 per cent. Land is, therefore, clearly the most important factor. In contrast, the average value of buildings per acre of land in farms increased from $4.24 to $7.20; that of implements and machinery from $0.89 to $1.44; and that of live stock from $3.67 to $5.60.

Another way to show the movement is to study the average value of farm property per farm. This, however, is not as satisfactory a basis as the average value per acre of land, because of the double movement. Between 1900 and 1910 the average size of farms decreased from 146.2 acres to 138.1 acres. This decrease of 8.1 acres, or 5.5 per cent, in the average size of farms counterbalanced in part the increase in the average value of all farm property per farm. On the other hand, the average acreage of improved land per farm increased 4.2 per cent, the decrease being entirely in the unimproved land. The increases, however, are not as large as they would have been had the farms remained the same in size. The average value of all farm property per farm for all farms in the United States was $3,563 in 1900, whereas in 1910 it was $6,444. The increase in the value of land alone was from $2,276 per farm to $4,476 per farm; that of buildings was from $620 to $994; that of implements and machinery was from $131 to $199; and that of live stock was from $536 to $774.

When all of these facts are brought together, it becomes clear that during the first ten years of the new century the increase in *quantity* of farm property was very small. I have already noted that the increase in the acreage of land in farms was only 4.8 per cent. Since the number of farms increased only 10.9 per cent, I think we may safely assume that the number of sets of farm buildings increased probably not more than 10.9 per cent. Doubtless during the decade there were many additional buildings added to those already on farms; but the number of new buildings erected was probably far short of the increase reported in value of the farm buildings. The increase in the acreage of improved land in farms was given as 15.4 per cent. We may assume that the increase in the quantity of implements and machinery was at least 15.4 per cent, and since the use of implements and machinery is increasing in agriculture more or less rapidly, we may assume that each farm has added to its supply of these classes of equipment; but I think we are safe in assuming that the quantity of implements and machinery did not increase as rapidly as the increase in value reported. Statistics are available showing the increase in the number of each class of domestic animals, as well as of poultry and bees, on farms, and the results show clearly that the increase is largely in average value per animal and only to a very small extent in the number of animals. The movement, therefore, during the first decade of the new century was clearly a very small increase in the quantity of agricultural property, but an extraordinarily large increase in the reported value.

When the quantity of farm property and farm production are under consideration, it is easy enough to predict that the movement of the next half century will be along the lines indicated earlier in this paper (draining of swamps, irrigation of arid and semi-arid lands, fertilizing worn out land, rotating crops in the most advantageous way, cultivating more intensively in order to increase production). It is also easy to predict that the rate of increase in the quantity of property will probably never again be as high as it was during the nineteenth century. But it would be hazardous even to attempt to predict what the movement will be with respect to the values of farm property, further than the readjustment in land values indicated above. We should keep constantly before us, however, the remarkable fact that the increase during the last ten years in the value of farm property was equal to the total increase in the value of farm property in the United States from the landing of Columbus until 1900. It would seem reasonable to contend that this movement could not continue at the same rapid pace; and yet we cannot discover counteracting forces.

Many reasons have been given from time to time for the increase in the prices of almost everything which can be sold and purchased. It is doubtless true that the various reasons for the increase in prices of all other articles of exchange apply also in the case of farm land and equipment. I wish only to add some of the special reasons why farm land has increased in value so rapidly during the last decade. Free land being practically a thing of the past, — no longer available for those who wish to take up agriculture,—

the prospective farmer was forced to start in a new way. Instead of moving to the frontier and depending upon the labor of himself and family to build up a farm, he was forced either to buy land or to start as a tenant on some land already in some other person's farm. The number of people wishing to buy land or to become tenants was thus increased, — being equal to the former number in this class and swelled by all those who otherwise would have gone to the frontier. The demand exceeded the supply. It was natural that the owners of land, finding more buyers than formerly, and finding more applicants among those who would become tenants than formerly, were able to secure either a larger price for the farms which they sold or a larger cash rental (or equivalent) for the farms which they leased. This problem, however, remains: if the farm did not produce more goods, or if the goods produced did not sell for higher prices, the prospective purchaser would be unable to pay the higher price for the land or the higher amount for rent, and therefore higher land values and higher rents would have been impossible, unless the new owners and tenants were reduced to a lower standard of living than formerly, or unless their surplus earnings of former years were reduced. That land values did go up, that the standard of living did not go down, and that farmers in the past were not able to save large amounts of their savings are, I believe, established facts. The extent to which land values increased is also an established fact. It is natural, therefore, that we should at once ask the question: "was the increase in price which the farmer received (whether due to the increase in quantity of goods produced or not) sufficient to warrant the increased capitalization of farm lands?"

The total value of the crops produced by the farmers of continental United States in 1909 was $5,487,161,223, as compared with $2,998,704,412 in 1899. There was, therefore, an increase in the total value of crops amounting to $2,488,456,811, or exactly 83 per cent. For our purposes we must assume that the figures here given represent the value to the farmers of all crops which they produced. No doubt these figures are not exactly the amount which they received for their crops, because in many cases the crops were fed to animals on the farms. But the values given represented the amounts which farmers could have got for the crops had they sold them in the local markets. For our purposes it is sufficient to state that the figures here quoted represent the *farm values* of all farm crops for both 1909 and 1899. In order to arrive at a figure representing the average value of all crops per acre of land in crops, I have assembled for 1909 and 1899 all crops for which it is possible to secure satisfactory acreage reports and value reports at both Censuses. For this purpose it was necessary to eliminate an important group of farm products, namely, orchard fruits, grapes, tropical fruits, and nuts. In these cases it is almost impossible to secure a statement of the exact number of acres involved, inasmuch as hundreds of thousands of farmers have small numbers of fruit trees in and around their yards for which it is impossible for them to report acreage. But inasmuch as we are able to eliminate the values of these crops for both years and do not include the acreage figures, the figures which remain are comparable. It should be noted in passing that these crops are far from the top of the list when we consider all farm crops. Several small crops must also be eliminated, but these are, practically speaking, insignificant.

Among these are maple sugar and syrup, for which there were no acreage reports; and also the forest products of farms. The total value of crops for which reports of acreage were secured in both 1909 and 1899 amounted in 1909 to $5,073,997,594, and in 1899 to $2,768,339,569. In both cases they amounted to more than 90 per cent of all crops as measured by value. The increase in the value of these crops was $2,305,658,025, or 83.3 per cent.

Turning now to the acreage of these crops, I wish to note that in 1909 the acreage of all crops with acreage reports was 311,293,382, and for 1899 the acreage was 283,218,280. The increase in the acreage, therefore, amounted to 28,075,102 acres, or only 9.9 per cent during the decade. It is perfectly clear from these figures, even if we went no further, that the average value of farm crops per acre of farm land under cultivation was greatly increased. It amounted to $16.30 in 1909 as compared with $9.77 in 1899, an increase of $6.53 per acre. This is an increase in the average value of crops per acre of 66.8 per cent. With these figures before us it is easy to see at least one of the reasons why the reported value per acre of farm land has advanced so rapidly. The total value of farm land increased because in the first place there was an increase in the total quantity of land in farms amounting to only 4.8 per cent. In the second place, there was an increase in the improved land in farms amounting to only 15.4 per cent. These changes in themselves warrant a material increase in the total value of farm land, but they do not justify an increase such as I have recorded above. When we turn, however, to the income from farm land and find that the average value of crops per acre has increased 66.8 per cent, it is not surprising that the farmers of the country have reported their lands at a higher figure than formerly. The remarkable feature of the reports is that the farmers should be able to judge so accurately the justifiable increase based upon the increase in the quantity of farm land combined with the increase in acreage of improved farm land, which in turn is combined with the increase in value of crops per acre of land actually in crops.

Before leaving the subject it will be well to refer to other causes for the increase in land values. Prior to 1900 (approximately) land was available in such large quantities that many persons wishing to buy land were unwilling to do so because of its producing capacity only. Much of the free land was equally as productive as the land for which the buyer must pay a price. Therefore the intelligent buyer bought because of desirable location and advantageous situation. Probably a considerable part of the price paid was paid because the land was favorably located on a river or lake, or because it was gently rolling, or the water was good, climatic conditions favorable, or the general outlook promising. Another part of the price was paid because of the adaptability of the farm. It was easily tilled, the fields were regular in size, there were no obstacles, the soil worked up well, or some other characteristic of this sort prevailed. But probably more important than either of these two facts has been the advantageous situation with reference to the market. Either the farm was close to the railroad where supplies might be secured, or the roads were good from the farm to the city or to the railroad, or the farm was advantageously situated with reference to large population centers and good markets. Because of an advantageous situation freight rates on supplies to the farm were low, as also were freight rates on the products from the farm. Thus the farmer had a larger surplus from his products and paid a lower price for supplies purchased than otherwise would have been the case. The surplus was attributed to the farm and higher land values resulted. In addition to these reasons for differences in land values in the past, a fourth reason must never be lost sight of. This fourth reason may well be referred to as the variations in Nature herself. Some land is most useful for the production of wheat, some for the production of cotton, and some land is naturally more fertile than other land. This natural adaptability has been capitalized and will be capitalized in the future. All of these reasons for wishing to own land, and added to these the desire for a home and a capitalization of the possibilities of the future, have become stronger in recent years.

Going one step further, I believe that the statistics collected by the Bureau of the Census in 1900 and in 1910 give a basis for deciding whether the higher value of crops per acre devoted to crops was due to the fact that more goods were produced on the land in use, or to a higher price paid for the goods which were produced. No prior Census reports give a basis for such a study, and even the reports for 1900 and 1910 do not give a basis for a complete analysis of this subject, nor is the basis sufficient to state absolutely the extent to which each of these forces was an influence. I believe, however, that figures can easily be presented which show that the movement during the last decade has been almost entirely a change in the price received by the farmer for his goods rather than an increase in the quantity of goods produced. This is an important feature of the new century movement.

What I have shown has been in the nature of an explanation of the rapid increase in the value of land and farm property generally. So far, no attempt has been made to prove that the increase in the average value of crops per acre was due to a change in the price of the product rather than to a change in the amount produced. In order to show this we will pass from a study of the acreage of crops and the relationship existing between acreage and value, to a study of the production together with the relationship between quantity produced and value. The most important group of crops is the general group designated as "cereals." Considering this as a whole, we find that whereas there was an increase of only 1.7 per cent in the number of bushels produced there was an increase of 79.8 per cent in the value. Clearly the increase here is due almost entirely to the increase in the value per bushel, not to any material increase in production. Turning our attention now to individual cereals, we find that there was an actual decrease in the quantity of corn produced of 4.3 per cent, yet at the same time an increase in the total value of the corn crop of 73.7 per cent. There was an increase of only 6.8 per cent in the quantity of oats produced, and yet there was an increase of 91.0 per cent in the value of that crop. Likewise the increase in the quantity of wheat produced was 3.8 per cent, whereas the increase in the value was 77.8 per cent. Without going into the same detail, it is sufficient to notice that in every other class, — barley, buckwheat, rye, kafir corn and milo maize, and rice, — the increase in value was much greater than the increase in quantity produced. The same thing is true in the case of such minor grains and seeds as dry edible beans, dry peas, peanuts, and flaxseed.

Turn now to other cases. For another crop of extraordinary importance, — that of hay and forage, — we find the same general story. There was an increase of 23.0 per cent in the number of tons produced, accompanied by an increase of 70.2 per cent in the value of the crop. The quantity of tobacco increased 21.6 per cent while the value of the crop increased 83.0 per cent. An increase of 11.7 per cent in the quantity of cotton produced was accompanied by an increase of 117.3 per cent in the value of the cotton crop. It is unnecessary here to list all of the farm crops which I have considered. Suffice it to say that in every case where the quantity of crop and value of the crop have been reported I have found the same tendency. It is worth while to note that in this study it is possible to make comparisons in the production of fruits and nuts. The quantity of small fruits decreased during the decade 7.9 per cent, while the value increased 19.8 per cent. The quantity of orchard fruits increased 1.8 per cent, while the value increased 68.2 per cent. Grapes increased 97.6 per cent in quantity but only 56.3 per cent in value. This item, however, needs explanation before it can be accepted. At the Census of 1900 the farmers were instructed to report the value of grapes in their natural form whenever they were disposed of in that form; but whenever they were disposed of in the form of dried grapes or raisins, or in the form of wine or grape juice, the reported value should be the value of the finished product rather than of the raw material. At the Census of 1910 the farmers were instructed to report in all cases the value of the grapes in their original form. The increase in the quantity of nuts produced was 55.7 per cent, whereas the increase in the value was 128.1 per cent.

Even if we went no further than this, there could no longer be doubt that the extraordinary increase in the total value of farm crops between 1899 and 1909 is attributable to higher prices rather than to larger quantities of the individual kinds of farm products. I do not wish, however, to stop at this point. I believe that it is possible to make an easy and almost exact calculation showing the extent to which the change in value of farm products is due to change in quantity produced and the extent to which it is due to the change in price. It is true that we cannot add together the quantities of cereals, hay and forage, tobacco, cotton, fruit, and therefore we cannot get the consolidated quantity by any process of weighting the units of measure. But it is possible to secure the average value per unit in 1899 for the individual crops for which both quantity produced and value were reported at both Censuses. Having secured the average value per unit in 1899 we may multiply this into the quantity of the crop produced in 1909. In this way we will secure the total value which would have been reported for each individual crop in 1909 if the average value per unit had remained the same as ten years earlier. In making this study it is necessary to eliminate certain crops, inasmuch as the values were not reported separately for a few minor crops in 1899, and further because quantities were not reported for certain minor crops at either Census. The quantity produced and the value, however, have been reported for something more than 90 per cent of all crops, as measured by value, both in 1899 and 1909.

The total reported value of the crops covered by the computation was $2,691,978,541 in 1899. The total reported value of the same crops was $4,934,489,828 in 1909. This is an increase of 83.3 per cent as compared with an increase of 83.0 per cent in the value of all crops, showing that the crops selected not only constitute approximately 90 per cent of all crops but also are representative of the whole. Had the average values per unit in 1899 prevailed until 1909 the total value of these same crops would have amounted to $2,962,358,477, which would have been an increase of only $270,379,936, or 10.0 per cent. This increase, I believe, represents very closely the actual increase in *quantity* of crops of all kinds during the decade. Having in mind all of the steps which were followed it is extremely interesting to note how closely the increase in the acreage of crops with acreage reports approaches this increase in quantity of products.

It must be clear, therefore, that if only 10.0 per cent of the increase in the total value of crops can be accounted for by the increase in the quantity, that the remainder must be attributed to an increase in the average value per unit. The difference between $4,934,489,828, which is the 1909 reported value of the crops being compared, and $2,962,358,477, which would be the 1909 value of the crops being compared if the average values of 1899 had continued until 1909, must represent the excess of actual values of the crops of 1909 over the values of 1909 on the basis of 1899 average values. This excess amounts to 66.6 per cent and represents evidently the average percentage increase in prices. Attention is now directed once more to an earlier part of this discussion, where I called attention to the fact that the average value, per acre, of crops with acreage reports was 66.8 per cent higher in 1909 than in 1899. It must be clear from all of these figures that this increase in average values of crops per acre is due almost entirely, if not entirely, to the change in prices rather than to change in the quantities of farm products.

In conclusion, I desire to direct attention to several figures which have been given out by the Census Bureau representing the movement between 1900 and 1910. Inasmuch as the figure given above, 9.9 per cent, represents the increase in acreage of crops with acreage reports, and inasmuch as the increase in other crops must have been at approximately the same rate, it is proper to compare this item with other items of growth. Similarly, inasmuch as the figure given in the preceding paragraph, 10.0 per cent, representing the excess of the value of the crops in 1909 on the basis of 1899 values over the values of the same crops in 1899, is virtually the consolidated expression of the general increase in quantity of crops produced, it may be compared with other items which have been made public. I wish to call attention, in comparison, to the increase in the number of farms between 1900 and 1910. This amounted to 10.9 per cent. The figure was compiled independently by the agricultural division of the Census Bureau. In the same connection, I wish to call attention to the increase in the rural population — which, however, includes places under 2,500 inhabitants, in addition to the agricultural population. The increase was 11.2 per cent. It should be noted that this tabulation was carried on by an entirely different and independent organization which was in complete charge of the population returns. That division has also reported that the increase in urban population amounted to 34.8 per cent. The movement during the last decade can clearly be summarized, therefore, as follows. There has been a very decided movement towards the cities. The increase in rural population, number of farms, acreage of land in crops, and quantity of crops approximated 10.0 per cent, whereas the increase in city population approximated 35.0 per cent. The farmers of the country have been unable to produce crops in proportion to the increased demands, their increase in production being only sufficient to supply the increased demands of the rural population and an increase of but 10.0 per cent in urban population. The prices of agricultural products have increased approximately 66.6 per cent, and at the same time there was an increase in the average value of crops per acre of 66.8 per cent. Accompanying this increase in the value of crops per acre (supplemented by a small increase in the quantity of land in farms and improved land in farms), farm property has been capitalized anew at a figure sufficiently high to take advantage of the changed conditions.

In the discussion, I naturally have been forced to use the figures for 1909 and 1899, since these are the only years for which definite and reasonably accurate statistics are available. The statistics for the other years are nothing better than estimates made by various individuals or government bureaus. It is best to hold to the absolute figures secured from the farmers and therefore I shall limit the study to these two years. After a very extensive study of climatic conditions and general agricultural conditions for the two years thus necessarily selected, I am ready to state my belief that they were typical or representative years, not abnormal in any material respect. In some districts conditions were exceptionally bad or exceptionally good in 1899, and the same was true of 1909. For the United States as a whole and for all crops which it is possible to bring into the analysis here presented, these years are as comparable as it is possible to find two years any distance apart.

It is true that the *hope* has been, and I believe I may say that the *belief* has been, that agriculture was increasing rapidly, if not keeping pace with the increase of population. The people of the United States have been more than willing to supply the Department of Agriculture, state agricultural experiment stations, and a great variety of agricultural schools, colleges, and lecturers with all of the funds necessary, believing that all of this pointed towards a larger production of goods as a basis for the food, beverage, and clothing supply of our people. Hundreds of millions of dollars have been expended for this purpose. It may seem that this expenditure has been in vain, since the average production of agriculture has not increased. But without it doubtless there would have been far-reaching decreases due to depreciation of the soil and failure of the farmers to maintain the average production secured when they first took charge. It is not my wish or purpose to discredit these agricultural agencies and institutions, which have been faithfully at work for over half a century. I believe thoroly in the work which they are doing, and in the high purposes which they have in mind. But hitherto the proportion of the effort expended by these agencies which has reached the actual farmer is comparatively small, and the amount absorbed by the farmers and put into practice even smaller. In other words, the work up to the present time has largely been experimental, or learning by experiment what ought to be done. Principles have then been taught in institutions to people who in turn have in mind the teaching of people to teach still other people. Up to the present time almost all of the work has been teaching various persons to teach; it has not been teaching the farmers to produce. Tho hundreds of millions of pages of literature have been distributed among farmers, only a small percentage has actually been read, and only a small percentage of that read has been put into practice. It has taken almost all, if not all, of the education which has reached the farmers to date, to prevent any downward movement in the quantity produced per acre of land actually cultivated.

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